



Independent Statistics & Analysis

U.S. Energy Information
Administration

Background Reference: Iraq

Last Updated: January 7, 2019

Overview

Iraq's economy is heavily dependent on oil revenues. One of the largest crude oil producers in the Organization of the Petroleum Exporting Countries (OPEC), Iraq also is one of the world's largest holders of proved crude oil reserves. Most of Iraq's major known fields are producing or are in development, and all of them are located onshore. The largest fields in the south have relatively low extraction costs as a result of uncomplicated geology, several supergiant fields, fields located in relatively unpopulated areas with flat terrain, and the close proximity of fields to coastal ports.

Iraq is re-developing its oil and natural gas resources after years of sanctions and wars. The country's production grew at a slower rate than the Iraqi government had expected during the past decade because of infrastructure bottlenecks in the south, supply disruptions in the north, and delays in awarding contracts.

Kurdistan Regional Government and Baghdad

The Kurdistan Regional Government (KRG), the official ruling body of the semiautonomous region in northern Iraq that is predominantly Kurdish, has been involved in disputes with national authorities related to sovereignty.

Northern Iraq production and exports have contributed to ongoing disputes between the central Iraqi government in Baghdad and the KRG. Before 2014, Iraq (Baghdad) produced most of the oil in the north, mainly at the Kirkuk field (Avana and Baba Domes) and the Bai Hassan field. However, after the Iraq-Turkey pipeline closed in March 2014 and the Baiji refinery closed in June 2014, northern production lacked access to export markets. The Iraq-Turkey pipeline was severely damaged by militants and became inoperable, and the Baiji refinery (Iraq's largest at the time) had to halt operations after being attacked by Islamic State (IS) militants.

Following U.S.-led airstrikes against the IS in August 2014, the Kurdish Peshmerga took over the northern Iraqi oil fields, and subsequently, the KRG resumed operations at the Avana Dome and Bai Hassan. The KRG-administered northern Iraqi oil is exported through the KRG-built independent pipeline, which connects the Kirkuk area fields and Turkey's Ceyhan port.

Agreement attempts to sell the northern Iraqi oil have had a number of difficulties. The KRG and Baghdad agreed to an oil transfer and payment scheme, and the KRG began transferring some of the crude oil at Turkey's Ceyhan terminal to Iraq's State Organization for Marketing for Oil (SOMO) in late

2014. The agreement was Baghdad's attempt to reclaim control over Iraq's northern crude oil exports, and in exchange, the KRG would receive payments from Baghdad equal to 17% of Iraq's federal budget. This second arrangement lasted until August 2015, when the KRG stopped oil transfers to SOMO. Transfers to SOMO were on hiatus until August 2016, when they resumed. This second arrangement lasted until June 2017.

Iraq has prioritized repairing parts of the pipeline that connect the northern field to the Baiji refinery. This pipeline was damaged by IS in 2014 and was unusable until June 2018. As of July 2018, the restored pipeline had a capacity of 40,000 barrels per day (b/d) and transports Kirkuk oil to the 140,000 b/d Daura refinery via Baiji. The second phase is expected to increase the capacity to 90,000 b/d and to provide crude oil volumes to the Baiji refinery once it has been repaired.¹

Future transportation expansion plans include construction of a new pipeline between Kirkuk and Kermanshah in Iran.

Petroleum and other liquids

According to the *Oil & Gas Journal* (OGJ), Iraq is one of the top holders of proved oil reserves in the world.² Iraq has five supergiant fields (defined as holding more than 5 billion barrels of oil reserves) in the south. The resource in place held by these supergiant fields accounts for about 50% of Iraq's total estimated reserves. An estimated 20% of oil resources are located in northern Iraq, including the areas of Kirkuk, Irbil, and Mosul.³

Iraqi crude oil output has seen a large increase, despite infrastructure bottlenecks, supply disruptions in the north, and contractual delays. However, the growth has been far lower than the government's target output. Future growth is uncertain, however, as a result of reduced investment in the oil sector, which resulted from lower crude oil prices between 2015 and 2017. The decrease in crude oil price, coupled with the costly war against the Islamic State (IS) in northern Iraq that has been ongoing since mid-2014, has caused Iraq's budget deficit to grow substantially. The growing deficit restricts the funds available for capital expenditures in the oil sector.

Although Iraq's production growth has slowed since the record-high annual growth of nearly 700,000 b/d in 2015, the country has increased crude oil output despite significant budget constraints, which resulted in lower spending plans and lower payments to international oil companies (IOCs). Even before the independence referendum, the KRG was also experiencing budgetary constraints that caused payment delays to IOCs. Since the KRG lost control of nearly half of the production from the Kirkuk-area oil fields, their budgetary problems have become even more problematic.

Oil sector management

The Ministry of Oil in Baghdad oversees oil and natural gas development and production in all but the Kurdish territory through its operating entities: the North Oil Company (NOC) and the Midland Oil Company (MDOC) in the north and central regions and the South Oil Company (SOC) and the Missan Oil Company (MOC) in the southern regions. In the Iraqi Kurdistan Region, the KRG, with its Ministry of Natural Resources, oversees oil and natural gas development and production. IOCs are very active in Iraq, including in the Iraqi Kurdistan Region. IOCs operate under technical service contracts (TSCs) in Iraq, which are signed by the Ministry of Oil in Baghdad, under production-sharing agreements (PSAs) that are signed by the KRG and cover the Iraqi Kurdistan Region.

Crude oil exports infrastructure constraints

Southern exports

Iraq has substantially expanded onshore pumping and storage infrastructure in the south during the past several years. Iraq's Basra and Khor al-Amaya ports are operating well below capacity after enduring three wars and insufficient maintenance, and capacity expansions since 2015 have alleviated some of the constraints. Nonetheless, Iraq will need further crude oil export capacity expansions if it hopes to increase crude oil production.

Capacity expansions in recent years include the addition of five single-point moorings (SPMs) near the Basra and Khor al-Amaya ports. The SPMs have a combined nameplate (design) loading capacity of 4.6 million b/d, although actual loadings are typically much less as a result of a lack of sufficient onshore pumping stations. The SPMs have added much needed shipping capacity to the southern export outlets.

Storage capacity at the southern ports remains limited. Current SOMO storage capacity in the south is about 10 million barrels, which is insufficient if Iraq plans to start marketing the Basrah Medium crude oil grade.

Common Seawater Supply Project

Production increases on the scale planned will also require substantial increases in natural gas and water injection to maintain enough reservoir pressure to increase recovery rates and boost oil production. Iraq has associated natural gas that could be used for reinjection, but much of the natural gas is currently flared. Iraq is working with its international partners and the World Bank to reduce natural gas flaring. Instead, the recovered natural gas will be used first for electricity generation.

Iraq plans to rely primarily on water injection to reach future production plateau targets. Iraq's South Oil Company (SOC) is undertaking the Common Seawater Supply Project (CSSP), which will treat seawater from the Persian Gulf and then transport it via pipelines to oil production facilities. The CSSP is expected to supply 12.5 million b/d of water, although the amount of water may change depending on the renegotiated production targets. The water will be sent to at least five southern Basra fields and to one field in the Missan province. Generally, Iraq's major southern oil fields require 1.5 barrels of water injected to produce 1 barrel of oil. The CSSP is considered a vital infrastructure project and key to Iraq's plans to expand crude oil production.

It is unclear when the CSSP will commence, especially given the recent setback with ExxonMobil's decision to exit the project. Negotiations between Iraq's Ministry of Oil and the ExxonMobil/Petrochina partnership had stalled, leading to Exxon's exit from the project in January 2018. Planning for CSSP began in 2009, and it was slated to start in 2013 to deliver more than 12 million b/d of water to major southern oil fields. The anticipated project start year has been pushed back a few times as a result of changes in management, administrative delays, and financing hurdles. At the earliest, CSSP could begin operations in 2022.⁴

Northern exports

Most of Iraq's major crude oil pipelines are located in the north and are currently not operable (Table 1). The pipelines have suffered substantial damage because of conflict and war, and rehabilitation would take years and a large investment. The Iraqi portion of the Iraq-Turkey (IT) pipeline stopped operating in March 2014 following several attacks by militants. Given the extremely unstable environment along the

pipeline and the extent of the pipeline’s damage, operations are unlikely to resume in the foreseeable future.

Currently, the only working major export-oriented pipelines in northern Iraq are two pipelines built by the KRG and its international partners: KRG’s main pipeline and the DNO/Tawke pipeline, both linking to the Turkey pipeline to the Ceyhan port. Several smaller pipelines carry crude oil from other fields to KRG’s main pipeline.

Figure 1. Iraq’s oil and natural gas infrastructure



Table 1. Status of main pipelines used to export crude oil produced in Iraq (including KRG area)

Name/description	Pipeline direction	Location	Nameplate capacity (000' b/d)	Status	Notes
Turkey section of Iraq to Turkey (IT) pipeline	Fishkhabur (Iraqi-Turkey border) to Ceyhan port (Turkey)	southern Turkey	1,500	operating	The pipeline transports oil produced in northern Iraq to the Turkish port of Ceyhan. It is connected to KRG's main pipeline. The pipeline has two parallel lines.
KRG's independent pipeline connecting to Turkey pipeline	Khurmala Dome to Fishkhabur	northern Iraq	700	operating	This pipeline carries crude oil produced at the Khurmala Dome and crude oil sent there from nearby fields, including Taq Taq. The KRG is working to increase the pipeline capacity.
DNO-KRG connection to Turkey pipeline	Tawke field to Fishkhabur	northern Iraq	200	operating	The pipeline transports oil produced at the Tawke field, operated by DNO, to Fishkhabur. From there, it connects to the Turkey pipeline for export at the Ceyhan. DNO and its partners are expanding the pipeline's capacity.
Iraq (Baghdad) section of Iraq to Turkey (IT) pipeline	Kirkuk to Fishkhabur	northern Iraq	600	not operating	The pipeline was the target of militant attacks and stopped operating in March 2014. The pipeline's effective capacity was significantly lower than its nameplate capacity prior to its closure. Crude oil exports from the pipeline averaged 260,000 b/d in 2013.
Kirkuk-Banias/Tripoli Pipeline	Kirkuk to Banias (Syria) and to Tripoli (Lebanon)	northern Iraq	700	not operating	One section of the pipeline links to Syria, and a branch goes to Lebanon. The pipeline was closed in the 1980s and opened in 2000. It was closed again in 2003 after it was damaged.
Strategic pipeline	Kirkuk to Persian Gulf	north to south (Iraq)	800	not operating	This pipeline is reversible and transports northern Kirkuk crude oil to the southern Basra Port and vice versa. The pipeline section from Basra to Karbala is operating with a capacity of 40,000 b/d and transports crude oil to Baghdad refineries.
Iraq pipeline to Saudi Arabia (IPSA)	southern Iraq to port of Mu'ajjiz in Saudi Arabia	southern Iraq & Saudi Arabia	1,650	Iraq portion is not operating	The portion that runs through Saudi Arabia was converted to transport natural gas to power plants (see Saudi Arabia

Sources: U.S. Energy Information Administration, Arab Oil & Gas Directory, Genel Energy, BOTAS (Petroleum Pipeline Corporation)



Crude oil grades

Iraq exports three grades of crude oil: Basrah Heavy, Basrah Light, and Kirkuk. In addition to these three grades, Iraq hopes to introduce a Basrah Medium grade, but this addition will depend on adding storage infrastructure in the south.

Basrah Light, Iraq's largest stream, is sourced from the southern fields, mainly from the Rumaila, West Qurna, Zubair, and Majnoon fields. Basrah Light is a medium, sour crude oil (29.88° API, 2.93% sulfur), and it had been subject to deteriorating quality when the West Qurna 2 and Halfaya fields came online. As a result, Iraq launched the Basrah Heavy grade in 2015.⁵

Basrah Heavy is a heavy, sour (24.03° API, 3.83% sulfur) crude oil grade, which is mainly sourced from Iraq's Missan province (Halfaya field and Missan cluster) and the West Qurna 2 field. Exports of the Basrah Heavy grade began in mid-2015, with most of the volumes headed to Asia, although exports of the grade to the United States and Europe have grown over time.⁶

The Kirkuk grade, which was traditionally exported through the Ceyhan terminal in Turkey is a 34.2° API, 2.24% sulfur crude oil grade. The Kirkuk blend is primarily produced in the Kirkuk area fields, but during the years, other northern fields have contributed to the grade.⁷

Liquid fuels consumption and refining

Most of Iraq's petroleum consumption needs are met by its domestic refineries; however, Iraq relies on imports of some petroleum products, including diesel, gasoline, and small volumes of kerosene.

Total nameplate (design) refinery capacity in Iraq is more than 1.1 million b/d as of July 2018 (Table 2); however, effective capacity is much lower at approximately 650,000 b/d. The difference between design and effective capacity in the northern refineries is mainly attributable to Iraq's war against IS in 2014–15, when a number of the facilities, including Iraq's largest refinery, Baiji, were destroyed or severely damaged. The Iraqi government plans to reduce its use of petroleum product imports by rehabilitating the refining sector, but the government has struggled in its efforts to attract the foreign investment needed in the downstream sector.

Iraqi refineries produce more heavy fuel oil than is needed domestically and not enough gasoline and diesel. Iraq plans to build four new refineries and to expand capacity at a number of existing refineries to alleviate domestic product shortages, reduce government import costs, and eventually to increase exports of refined products. The planned new refineries and capacity expansions would add 700,000 b/d of refining capacity.⁸

Table 2. Existing oil refineries in Iraq, 2018

Refinery	Nameplate (design) capacity ('000 b/d)	Effective capacity ('000 b/d)	Notes
North Refineries Company			
Baiji	310	0	The severely damaged Baiji is not operating. Effective capacity was 230,000 b/d before the June 2014 attack on the refinery by IS. Plans include installing crude oil distillation units that would increase effective capacity to 70,000 b/d.
Kirkuk	53	53	
Sininya	30	20	
Hadeetha	16	10	
Qayara	16	14	Qayara was severely damaged by IS. Effective capacity was about 10,000 b/d in the fall of 2016. After repair work, the refinery came back online in 2017 with capacity of about 14,000 b/d.
Kasak	10	10	
Total north	435	107	
Midland Refineries Company			
Daura	210	140	
Najaf	30	30	Planned expansion will add 20,000 b/d of capacity.
Samawah	30	30	
Diwaniya	20	20	
Total midland	290	220	
South Refineries Company			
Basrah	210	135	
Missan	30	30	
Nassiriya	30	30	
Total south	270	195	
KAR Group (Iraq Kurdistan)			
Kalak (near Erbil)	100	100	
Qaiwan Group (Iraq Kurdistan)			
Bazian (near Sulaimanya)	34	20	Planned expansion will add 66,000 b/d of capacity.
DNO (Norway)			
Tawke	6	6	
Total Iraqi Kurdistan Region	140	126	
Total Iraq	1,135	648	

Source: U.S. Energy Information Administration based on information from the Northern and South Refineries Companies, Iraq Oil Report, IHS Markit, and Energy Intelligence Group.

Natural gas

Because of insufficient pipelines and other infrastructure to transport and store natural gas for consumption and/or export, Iraq flares relatively large volumes of its natural gas production. To reduce flaring, Iraq's state-owned South Gas Company (51%) signed an agreement with partners Royal Dutch Shell (44%) and Mitsubishi (5%) in 2011 to create a new joint venture—Basrah Gas Company—to capture flared gas at three large southern oil fields—Rumaila, West Qurna 1, and Zubair. The 25-year venture, which is estimated to cost US \$17 billion, entails upgrading current facilities and building new facilities and processing plants.

In the long term, the joint venture may construct a liquefied natural gas (LNG) exporting facility—the Basrah Gas LNG Project. Under the agreement, processed natural gas would first be available to the South Gas Company for power generation. Any natural gas not bought for use by Iraqi power plants could be exported via the LNG plant. This agreement is also critical for the new oil development projects, which would use some of the natural gas for reinjection.

Iraq began importing natural gas from Iran in June 2017 to fuel electric power plants near Baghdad, including stations in Al-Besmaya, Al-Quds, Al-Mansuriyah, and Al-Sadr.

Electricity

Iraq generates electric power from liquid fuels, natural gas, and hydro resources. In addition, it also relies on electricity imports from Turkey and Iran to meet domestic demand. Although Iraq has made some progress to increase its generation capacity during the past few years, it has struggled to meet its power needs. Much like its Gulf neighbors, Iraq faces a sharply rising demand for power. Parts of Iraq continue to experience power blackouts and load shedding, particularly during the summer, despite increased natural gas-fired generation and increases in electricity imports from Iran and from Turkish electricity barges (floating power plants) in the Persian Gulf.⁹ Iraqi households and businesses must rely on expensive off-grid, private, diesel-fueled generators to address the shortfall. In addition, Iraq's distribution system has deteriorated because of poor design, lack of maintenance, and electricity theft, which has resulted in large distribution losses, low voltage levels, and frequent disconnections.¹⁰

Iraq also gets hydroelectric power from the Mosul dam, located on the Tigris River north of Mosul city. IS briefly took control of the dam in August 2014 following the start of the group's occupation of Mosul, but KRG's Peshmerga forces and the Iraqi army regained control of the dam shortly after. The Mosul dam is reportedly at risk of collapse because of its initial poor construction.

A major issue Iraq faces is the lack of natural gas, and at times, water, to fuel its power plants. Iraq's electricity expansion plan is expected to be fueled primarily by natural gas-powered turbines. Most current Iraqi natural gas production is flared, and pipelines will need to be built to bring natural gas, which would otherwise be flared, to future power plants.

Iraq's oil and natural gas industry is the country's largest industrial customer of electricity in Iraq. Large-scale increases in oil production would require commensurate increases in electric power generation. However, Iraq has struggled to keep up with the demand for electricity, with shortages common across the country. Significant upgrades to the electricity sector would be needed to supply additional power.

Delays in meeting projected targets may mean insufficient power supply to meet the projected demands of the oil sector.

The Iraqi government heavily subsidizes electricity at an estimated \$11 billion. Most Iraqi end users do not pay for the electricity delivered, leaving the government to carry nearly all of the cost.¹¹ The government has attempted to implement reforms and to institute bill collections, but these changes have proven deeply unpopular with the population, especially in the poorer areas.

Notes

- In response to stakeholder feedback, the U.S. Energy Information Administration has revised the format of the Country Analysis Briefs. As of December 2018, updated briefs are available in two complementary formats: the Country Analysis Executive Summary provides an overview of recent developments in a country's energy sector and the Background Reference provides historical context. Archived versions will remain available in the original format.
- Data presented in the text are the most recent available as of December 2018.
- Data are EIA estimates unless otherwise noted.

Endnotes

¹ FGE, *Middle East Oil Monthly* (June 21, 2018)

² *Oil & Gas Journal*, Worldwide Look at Reserves and Production, (January 1, 2018).

³ Rystad Energy, UCube Browser, accessed July 2018.

⁴ *Middle East Economic Survey*, "Exxon Walks Away From Iraq Seawater Project," June 22, 2018.

⁵ Energy Intelligence, World Crude Oil Data, Iraq Country Profile (accessed July 2018).

⁶ Ibid

⁷ Ibid

⁸ Energy Intelligence Group, "Iraq Ramps Up Refinery Runs," (April 24, 2018), Northern and South Refinery Companies, *Iraq Oil Report*, and IHS Markit.

⁹ *Middle East Economic Survey*, "Iraq Adds Upgrades to Gas-Fired Plants, Keeping Pressure on Rising Supplies," (December 8, 2017).

¹⁰ International Energy Agency, *World Energy Outlook Special Report: Iraq Energy Outlook*, (October 2012), page 92.

¹¹ *Iraqi Oil Report*, "Iraq pushes electricity reform, prompting protests," (January 18, 2018).